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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,995	12/05/2003	Bor-Wen Chan	24061.58 (TSMC2002-1399)	9115
42717	7590	09/21/2005	EXAMINER	
HAYNES AND BOONE, LLP 901 MAIN STREET, SUITE 3100 DALLAS, TX 75202			HU, SHOUXIANG	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/728,995

Applicant(s)

CHAN ET AL.

Examiner

Shouxiang Hu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 7-15, 24-27 and 34-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 16-23 and 28-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

According to the previous office action, claims 1-36 are pending in this application; and, claims 1-6, 16-23 and 28-33 remain active in this office action

Specification

The disclosure is objected to because of the following informalities and/or defects:

In paragraph 0024, the specification discloses a method of forming a contact region 230 that is made of a silicide or silicide that is in contact with the polymer spacer as shown in Fig. 2. However, it is not clear how the polymer spacer in such feature could survive at the elevated temperature that is normally required during the formation of a silicide material. Applicant's relevant arguments made in the 06-28-2005 amendment have been fully considered but they are not persuasive, as the specification does disclose such a silicide(or silicide)-over-polymer method, but it does lack an adequate description regarding how such an apparently non-trivial method could be implemented, so as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention, regardless whether the disclosure also discloses any other methods.

Appropriate correction is required.

Claim Objections

Claim 3 is objected to because of the following informalities and/or defects:

Claim 3 recites the subject matters that the substrate is formed of diamond.

However, the disclosure lacks an adequate description regarding how the recited diamond substrate is formed, and how the recited patterned feature is formed thereon.

Appropriate correction is required.

Response to Declaration

The declaration of Han-Jan Tao filed on June 28, 2005 under 37 CFR 1.131 has been considered but is ineffective to overcome the prior art reference of Chen (US 2003/0143788 A1), because:

The evidence submitted is insufficient to establish diligence from a date prior to the date of reduction to practice of the Xu reference to either a constructive reduction to practice or an actual reduction to practice. The time period from applicant's alleged reduced-to-practice date that is prior to the Xu reference, as declared in the above declaration, to the application date of December 05, 2003 of the instant application is a substantially lengthy one; however, the declaration lacks sufficient evidence(s) to show diligent practice/development about the instant invention during this period, as according to MPEM 715.07(a): applicant must show evidence of facts establishing diligence.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 5-6, 16-17, 20-23, 29 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Xu et al. ("Xu"; US 2004/0157457).

Xu discloses a method of manufacturing a microelectronic device (Figs. 1 and 12-16; and Table 1; also see paragraphs 0039, 0048, 0055 and 0083), comprising: forming a patterned feature (a gate structure; 1210 and/or 1215) over a substrate (1200); depositing a conformal polymer layer (1220) over the patterned feature and the substrate by employing a fluorine-containing plasma source (CF₄); and etching the polymer layer to expose the patterned feature and a portion of the substrate, thereby forming polymer spacers on opposing sides of the patterned feature (see Fig.12E).

Regarding claim 17, the flow rate of the fluorine-containing chemistry in Xu can be between about 5 sccm and about 200 sccm (Table I).

Regarding claims 20-21, the fluorine-containing chemistry in Xu further includes a bromine-containing gas (HBr; see paragraphs 0088-0081).

Regarding claims 22-23, the etching in Xu employs an oxygen-containing gas (O₂; paragraph 0055).

Regarding claim 29, the step of depositing the polymer layer in XU employs a RF bias applied to the substrate at a power ranging between about 1 Watts and about 50 Watts (0038 and 0083).

Regarding claim 31, the etching of the spacer in Xu employs a RF bias applied to the substrate at a power of about 60 Watts (0048).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-4, 18-19, 28 and 30, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Xu.

The disclosure of Xu is discussed as applied to claims 1-2, 5-6, 16-17, 20-23, 29 and 31 above.

Regarding claims 3-4, Xu does not expressly disclose that the substrate can comprise diamond or strained silicon. However, it is noted that diamond is an art-known material for high strength and high stability applications; and that strained silicon is art-known for better channel performance. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a microelectronic device using the method of Xu with the substrate comprising diamond or strained

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silicon, so that a method for forming a microelectronic device with improved strength and stability and/or with improved channel performance would be obtained.

Regarding claims 18-19, Xu does not expressly disclose that fluorine-containing chemistry can further include a chlorine-containing gas such as Cl_2 and Chlorocarbons. However, such chlorine-containing gas is also an art-known gas added for the formation of a fluorine-contained polymer. In addition, it is noted that, in view of applicant's arguments about the embodiments being non-distinctive, applicant's non-compliance with the further election requirement between the identified two species respectively with the two further comprised gases (a chlorine-containing gas, and a bromine-containing gas) is hereby treated as an admission of non-distinctive between the two species, as explained in the election/restriction section above in this office action. It is further noted that, should applicant traverse on the ground that the species are not patentably distinct, and if the examiner finds one of the inventions unpatentable over the prior art, the admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a microelectronic device using the method of Xu with the further comprised gas being a chlorine-containing gas such as Cl_2 and Chlorocarbons, so that a method for forming a microelectronic device with desirable properties and/or improved material choice for the formed fluorine-contained polymer would be obtained.

Regarding claims 28 and 30, although Xu does not expressly disclose that the bias to the substrate can also be a DC bias, one of ordinary skill in the art would readily recognize that such DC bias is also an art-known bias method for achieving desirable process condition for forming and/or etching a polymer layer, as readily evidenced in the prior art such as Sivaramakrishnam et al. (US 5,958,510; see col. 2, lines 16-23; and col. 3, lines 44-50). And, it further noted that the bias power is an art-recognized parameter of importance subject to routine experimentation and optimization.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a microelectronic device using the method of Xu with the substrate bias being a DC bias with the recited bias power, so that a method for forming and/or etching the polymer film in the microelectronic device with desired and/or optimized process condition would be obtained.

Claims 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rupp et al. ("Rupp"; US 6,444,531) in view of Xu.

Rupp discloses a method of manufacturing a microelectronic device (Figs. 1-5), comprising: forming a patterned feature (4b, a gate structure) over a substrate (2); depositing a conformal polymer layer (8) over the patterned feature and the substrate; etching the polymer layer to expose the patterned feature and a portion of the substrate, thereby forming polymer spacers (10c and 10b) on opposing sides of the patterned feature (see Fig.3); forming source/drain regions (12A AND 12B) in the substrate on

opposing sides of the patterned feature; and, removing the spacers after forming the source/drain regions (Fig. 5).

Although Rupp does not expressly disclose that the polymer layer can be formed by employing a fluorine-containing plasma source, one of ordinary skill in the art would readily recognize that fluorine-containing plasma source is commonly used to form a polymer layer for forming sacrificial spacers with desirable properties, as evidenced in Xu, whose disclosure is discussed as applied to claims 1--6, 16-20-23, 28-29 and 30-31 above.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the forming and etching of fluorine-contained polymer of Xu into the method of Rupp, so that a method for forming a microelectronic device with desired properties for the sacrificial spacers would be obtained.

Response to Arguments

Applicant's arguments filed on June 28, 2005 have been fully considered but they are not persuasive. Applicant's main arguments include: Xu is not a valid prior art reference. In response, it is noted that Xu still remains to be valid prior art reference in the instant case, as the declaration of Han-Jan Tao filed on June 28, 2005 under 37 CFR 1.131 has been considered but is ineffective to overcome the prior art reference of Chen (US 2003/0143788 A1), as explained in the section of Response to Declaration above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

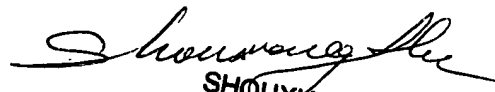
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For

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more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH

September 16, 2005


SHOUXIANG HU
PRIMARY EXAMINER